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# WEIGHING BALES OF COTTON AT THE COMPRESS

U.S. DEPARTMENT OF AGRICULTURE • AGRICULTURAL MARKETING SERVICE
TRANSPORTATION AND FACILITIES RESEARCH DIVISION AMS-534

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Washington, D. C. May 1964

## SUMMARY

Cotton warehousemen who weigh 100,000 bales of cotton annually, at the time the bales are compressed and shipped for export or domestic use, can reduce the cost of the weighing operation by $7,000 to $9,000 by adopting an improved method of weighing described in this report. This saving is based on a compressing rate of 100 bales per hour. The improved method, which uses an electronic scale in combination with an automatic dinky press feeder (a conveyor that feeds bales to the dinky press), is compared with two current methods of weighing bales on portable platform scales. Labor required for the weighing operation is reduced from 10 or 11 to 4 men. (In this study, weighing includes the work of moving bales to and from the compress.) Cost of the equipment required for the improved method can be recovered in less than a year, in a warehouse weighing 100,000 bales at the compress annually, depending on the method and equipment presently used.

Research to increase the efficiency of handling cotton during marketing may improve cotton's competitive position in domestic or foreign markets, and benefit the consumer by holding down costs for marketing cotton and cotton products. The savings that can be realized with the improved method of weighing are estimated for warehouses weighing annual volumes of 30,000 to 200,000 bales at the compress.

The improved method of weighing may be used for both flat and standard-density bales.

The electronic scale is easier to read than platform scales, thus reducing chances of human error in reading bale weights.

# WEIGHING BALES OF COTTON AT THE COMPRESS

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## BACKGROUND

Weighing bales of cotton at the time they are compressed for export is one of the handling tasks performed by cotton warehousemen. In 1963-64, 5.2 million bales of cotton are expected to be exported.[1/] Bales for domestic use are also weighed by the warehousemen, at the time they are compressed for shipment, when the seller or buyer requests it. (Export bales are compressed to high density, and bales for domestic use, to standard density.)

Bales are usually weighed on portable platform scales, set up so that weighing can be done as the bales are being moved to the compress or, after they are compressed, as they are being moved to a loading out area. Whether bales are weighed before or after compressing, a crew of 9 to 12 is usually required to weigh and move bales to and from the compress, to keep pace with the compressing rate.

Research to increase the efficiency of handling cotton during marketing improves cotton's competitive position in domestic or foreign marketing, and may benefit the consumer by holding down marketing costs for cotton and cotton products. As part of such research, a study was made of an improved method of weighing, with an electronic scale used in combination with an automatic dinky press feeder. This method requires only 4 men to weigh and move bales to and from the compress.

The labor and machine requirements discussed in this report include only the work involved in weighing bales and moving them to and from the compress. They do not include work done at the dinky press or at the compress.

## FLAT BALES

When flat bales are being compressed to high or standard density, they are first placed in a dinky press, which compresses them slightly so that the bands can be removed, and then placed in the compress. In two methods of weighing

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1/ U. S. Foreign Agricultural Service. Cotton Production Sets New Record in 1963-64. World Agr. Prod. and Trade Stat. Rpt., pp. 13-15. Feb. 1964.

described here, the bales are weighed before they are placed in the dinky press. In the third method, flat bales are placed in the dinky press, then in the compress, and weighing is done after the bales are removed from the compress.

To make valid comparisons among these three methods, it is considered that the weighing operation consists of two cycles: The first cycle begins at the pressing block (where bales to be compressed are temporarily stored) and ends when bales are placed in the dinky press or on the automatic dinky press feeder. The average transport distance is 100 feet from the pressing block to the feeder or to a temporary block where bales are picked up on hand trucks. The second cycle begins after the bales are compressed and ends when the bales are transported an average distance of 100 feet either from the compress or from a temporary block to a loading out area.

## Electronic Scale

The electronic scale consists of a load cell, amplifier, and digital weight indicator. The load cell transmits an electrical impulse through the amplifier to the indicator, which shows the weight of a bale in pounds. The layout of the electronic scale in combination with the automatic dinky press feeder is shown in figure 1.[2/] The platform, A-frame, and a 1,000-pound-capacity electric hoist with bale hooks of the scissors type are all part of the automatic feeder; figure 2 shows side and end views of the layout. Each side of the platform holds 3 flat bales.

The load cell is attached to the hoist and the bale hooks by lock hooks and eyebolts. Two-inch steel angles, about 5 feet long, are welded to the A-frame about 2 feet below the top rail to hold 3 support wires for the scale cable. The cable is strung through rings on the support wires so the cell may move freely, with the hoist, back and forth over the platform. The weigher's desk, which holds the amplifier, digital indicator, and weighing records, is located about 8 feet in front of the guardrail at the conveyor.

A 4-man crew--two clamp-truck operators, a weigher, and a hoist operator--can handle the two cycles of the weighing operation for compressing rates up to 185 bales per hour (this is a peak rate that may be reached from time to time during the pressing day; the average pressing rates are 100 or 125 for high density bales and 120 to 145 for standard density bales).

One clamp-truck operator transports 3-bale unit loads from the pressing block to the platform. The weigher obtains identifying coupons from tags on the bales, which are weighed in the order that coupons are collected. The hoist operator inserts the bale hooks below the first band on each side of the bale and operates the hoist to lift the bale free of the platform and other bales while it is weighed. The weigher operates the scale control switch and records the weight of the bale. The hoist operator then moves the bale over to the conveyor and topples it over, buckle side up (fig. 3).

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2/ The electronic scale is calibrated at the factory according to the buyer's needs. The warehouseman can usually install the scale.

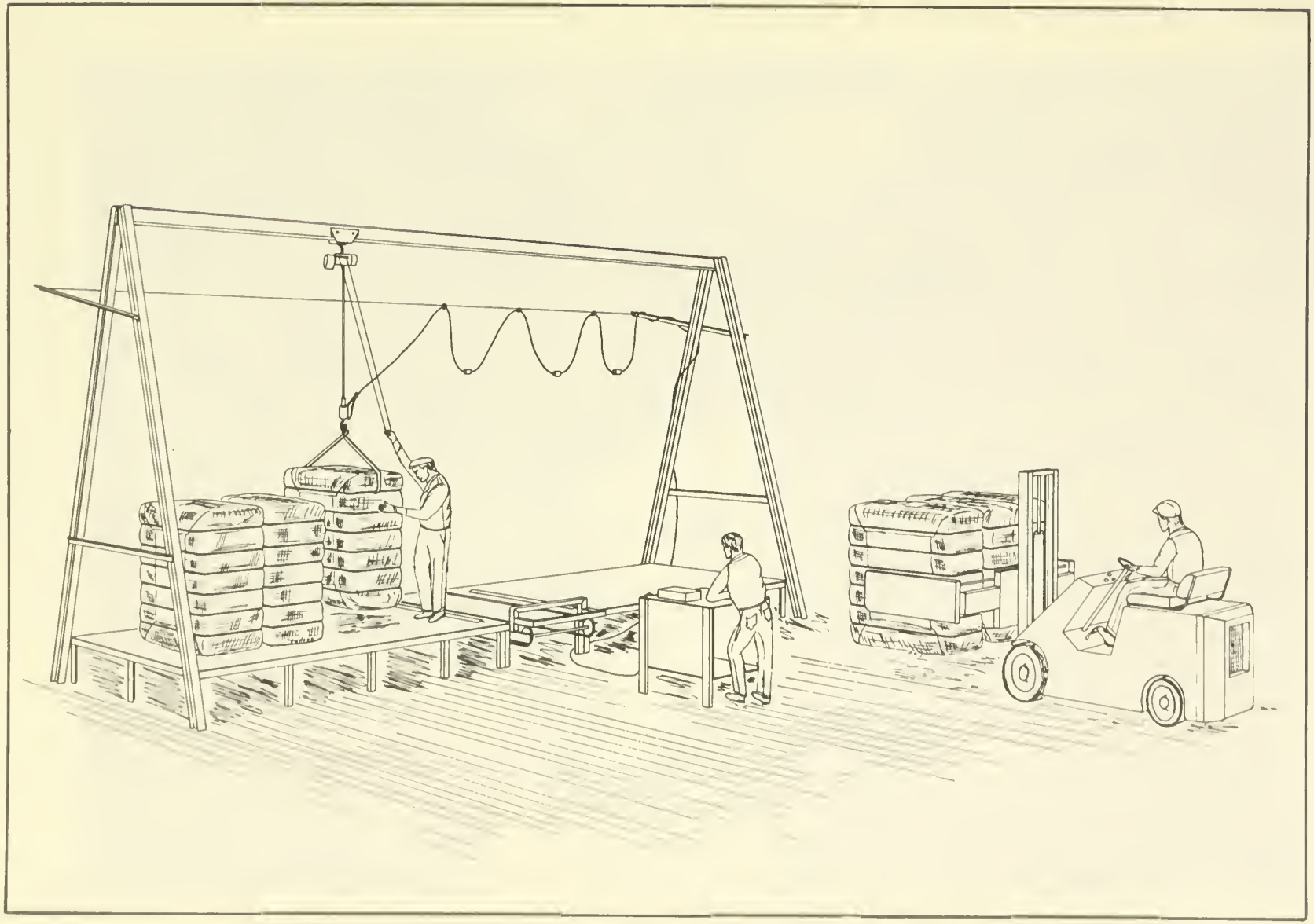
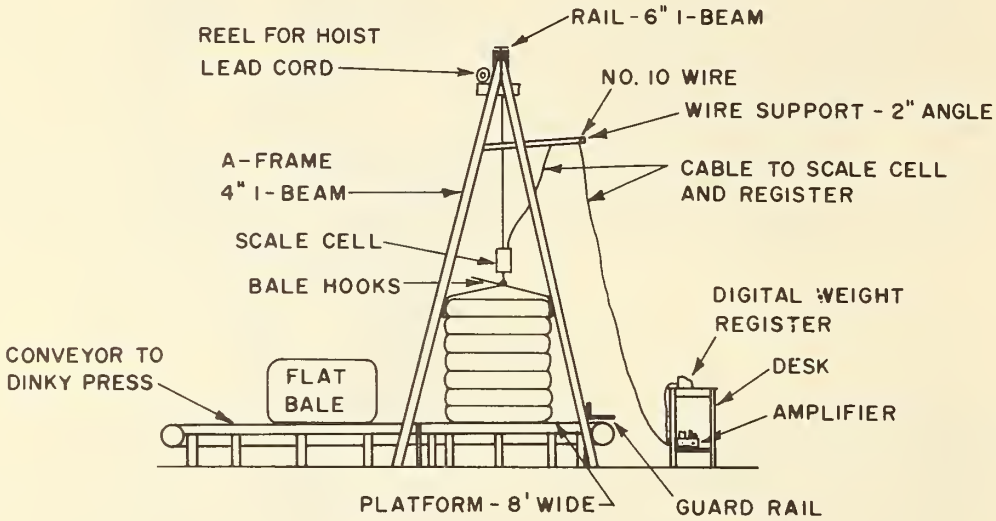
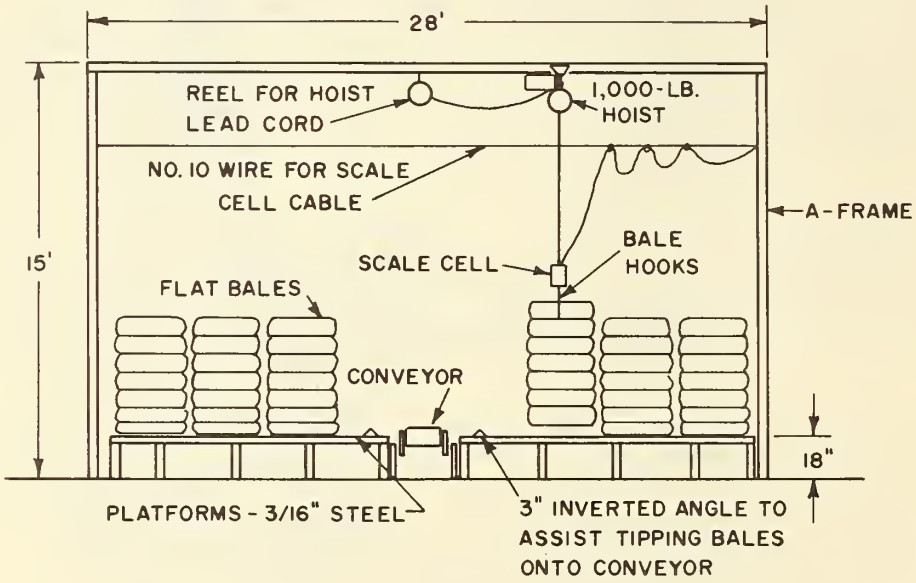


Figure 1.--The electronic scale layout at the dinky press feeder.

ELECTRONIC SCALE AT DINKY PRESS FEEDER




SIDE VIEW




FRONT VIEW

Figure 2

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Figure 3.--Hoist operator toppling bale over on conveyor and bales resting on conveyor chain.

The second clamp-truck operator transports 3-bale unit loads from the compress to the loading out area.

The labor cost per hour is $6.20, based on the following assumed[3/] wage rates: Hoist operator, $1.25; clamp-truck operators, $1.35; and weigher, $2.25 per hour.

Equipment cost is estimated at $4.68 per hour (appendix table 8), and the total cost for labor and equipment is $10.88 per hour.

The cost per bale varies with the compressing rate. For example, at a pressing rate of 100 bales per hour, the cost per bale is 11 cents; at 125 bales per hour, the cost per bale is 8 3/4 cents; and at 90 bales per hour, the unit cost is 12 cents.

## Platform Scale, Weighing Before Compressing

Crew sizes for weighing bales on platform scales before they are compressed vary according to the operating practices of the warehouseman, but in most cases 10 men are needed to keep up with compressing rates up to 185 bales per hour. This number includes a clamp-truck operator who transports compressed bales from the compress to the loading out area. Nine men handle the moving of bales to the scale, weighing them, and moving them from the scale to the dinky press.

The platform scale is set up about 20 feet away from the dinky press. A clamp-truck operator transports 3-bale unit loads from the pressing block to a temporary block about 20 feet from the platform scale. At the temporary block, a pull-down man helps load bales onto hand trucks, buckle side up. Five hand-truck operators move bales from the temporary block to the scale, wait while the bales are weighed, and then move them from the scale to the dinky press. The hand-truck operators then return to the temporary block for the next bale. The distance between the dinky press and the temporary block is also 20 feet. At the scale, one man (a tag checker) removes a coupon from the bale tag and calls out the number to the weigher. The weigher operates the scale and records the bale weight.

The labor cost for the operation is $13.95 per hour, based on the following assumed wage rates: Hand-truck operators and pull-down man, $1.25; clamp-truck operators, $1.35; tag checker, $1.50; and weigher, $2.25 per hour.

The hourly equipment cost, based on appendix table 8, is $4.07, making the total hourly cost $18.02.

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3/ Assumed wage rates are used for clarity in presentation and convenience in making comparisons. Actual wage rates in cotton warehouses vary widely from area to area. Warehousemen can compute their own costs by substituting rates that apply to their own situations.

At a pressing rate of 100 bales per hour, the cost per bale would be 18 cents. At pressing rates of 125 and 90 bales per hour, the cost per bale would be 14½ cents and 20 cents.

### Platform Scale, Weighing After Compressing

Bales are usually weighed after they are compressed when the warehouse is equipped with an automatic dinky press feeder. The two cycles of the weighing operation, as described in this report, generally require 11 workers for pressing rates up to 185 bales per hour.

One clamp-truck operator moves 3-bale unit loads from the pressing block to the dinky press platform and an electric-hoist operator moves bales from the platform onto the conveyor.

The portable platform scale is located about 20 feet from the compress. After the bales are compressed, one man operates a jib crane to lift and place bales on hand trucks. Four hand-truck operators move bales to the scale, wait while the bales are weighed, and move them about 20 feet to the temporary block. The hand-truck operators then return a distance of 20 feet to pick up the next loaded hand truck. At the temporary block, another worker (a set-down man) helps unload bales from hand trucks. At the scale, one man (a tag checker) calls out the warehouse bale-tag number and removes a coupon from the bale tag, and the weigher operates the scale and records the bale weight. Another clamp-truck operator transports bales from the temporary block, an average distance of 100 feet, to the loading out area.

The hourly labor cost is $15.20, based on the following assumed wage rates: Hoist, jib-crane and hand-truck operators, and set-down man, $1.25; clamp-truck operators, $1.35; tag checker $1.50; and the weigher, $2.25 per hour. The hourly equipment cost is $4.94 (appendix table 8), and the total labor and equipment cost per hour is $20.14

The cost per bale at three pressing rates is: 20 cents at 100 bales per hour; 16 cents at 125 bales per hour; and 22 cents at 90 bales per hour.

## STANDARD DENSITY BALES

Some warehousemen compress bales to standard density on receipt and repress bales that are to be exported to high density at the time they are shipped. Although the dinky press is not used for removing bands from standard density bales (it is sized for flat bales), the improved method of weighing, with the same crew size, can be used for standard density bales. The bales are handled in the following manner:

A clamp-truck operator transports the bales, usually in unit loads of four, and sets them down on head on the dinky press platform. The weigher and hoist operator weigh and handle the bales in the same manner as flat bales, including placing the bales buckle side up on the conveyor leading to the dinky press. While the bales are on the conveyor, all but the two

end bands are cut and removed. The bales are toppled into the dinky press and then picked up on hand trucks. The two end bands on each bale are cut and removed while the bale is on the hand truck, and the bale is then placed in the compress. The crew required to cut and remove bale bands and place bales in the compress is the same as that normally used for this work.

Warehousemen may wish to install guardrails along the back of the feeder platform to stabilize standard density bales standing on head.

## DISCUSSION

The possible annual saving in cost of weighing bales when the improved method of weighing (electronic) is used depends on the present method of weighing, the annual volume of bales weighed at the compress, and the rate of compressing. Table 1 is presented to help warehousemen determine the saving possible and the time in which the cost of the necessary equipment could be recovered. Initial cost of the electronic scale is estimated at $2,700, and the automatic dinky press feeder with electronic hoist at $3,800 (appendix table 8).

In warehouses equipped with an automatic dinky press feeder, for example, where bales are weighed after compressing, cost of the electronic scale could be recovered in less than two years when the annual volume of bales weighed is 30,000. The annual saving ranges from $2,700 at a compressing rate of 100 bales per hour to $1,950 at 145 bales per hour. At the same volume, in warehouses that do not have an automatic dinky press feeder, where bales are weighed before they are compressed, the annual saving ranges from $2,100 to $1,500, depending on the compressing rate, and 3 to 4 years would be required to recover costs of the scale and dinky press feeder.

Even at smaller annual volumes than those shown in the table, a significant reduction in weighing costs can be realized by adopting the improved method. In a warehouse weighing 10,000 bales at the compress per season, for example, costs of weighing can be reduced by about $700, or 40 percent less than present costs.

Some warehousemen use more and some fewer workers in the weighing operation than have been described in this report. Such operators can determine the value of the improved method in their warehouses by substituting the labor and equipment costs that apply in their situation.

In addition to reducing costs of the weighing operation, the electronic scale weighs more accurately than presently used platform scales. Accuracy of the electronic scale is within one-tenth of 1 percent of a given weight (error in weighing a 500-pound bale would be no more than 1/2 pound). Accuracy of platform scales is estimated to be within 1 percent of a given weight; error in weighing a 500-pound bale could be 5 pounds.

The digital indicator of the electronic scale, which shows only the figures for the bale being weighed, is much easier to read than the dial of platform scales, thereby reducing the chance of human error in reading weights.

Table 1.--Annual costs of weighing bales at the compress at various production rates and volumes 1/

| Compressing rate and method of weighing | Annual cost when number of bales weighed is-- | | | | | |
|---|---|---|---|---|---|---|
| | 30,000 | 45,000 | 60,000 | 100,000 | 150,000 | 200,000 |
| | Dollars | Dollars | Dollars | Dollars | Dollars | Dollars |
| 100 bales per hour: | | | | | | |
| Electronic scale.. | 3,300 | 4,900 | 6,600 | 11,000 | 16,500 | 22,000 |
| Platform scale, weighing before compressing..... | 5,400 | 8,100 | 10,800 | 18,000 | 27,000 | 36,000 |
| Platform scale, weighing after compressing..... | 6,000 | 9,000 | 12,000 | 20,000 | 30,000 | 40,000 |
| 125 bales per hour: | | | | | | |
| Electronic scale.. | 2,630 | 3,940 | 5,250 | 8,750 | 13,100 | 17,500 |
| Platform scale, weighing before compressing..... | 4,350 | 6,530 | 8,700 | 14,500 | 21,750 | 29,000 |
| Platform scale, weighing after compressing..... | 4,800 | 7,200 | 9,600 | 16,000 | 24,000 | 32,000 |
| 135 bales per hour: | | | | | | |
| Electronic scale.. | 2,400 | 3,600 | 4,800 | 8,000 | 12,000 | 16,000 |
| Platform scale, weighing before compressing..... | 3,900 | 5,850 | 7,800 | 13,000 | 19,500 | 26,000 |
| Platform scale, weighing after compressing..... | 4,500 | 6,750 | 9,000 | 15,000 | 22,500 | 30,000 |
| 145 bales per hour: | | | | | | |
| Electronic scale.. | 2,250 | 3,380 | 4,500 | 7,500 | 11,250 | 15,000 |
| Platform scale, weighing before compressing..... | 3,750 | 5,630 | 7,500 | 12,500 | 18,750 | 25,000 |
| Platform scale, weighing after compressing..... | 4,200 | 6,300 | 8,400 | 14,000 | 21,000 | 28,000 |

1/ Annual costs (rounded off to the nearest $10) are based on estimated hourly costs of $10.88 for the electronic scale, $18.02 for the platform scale, weighing before compressing, and $20.14 for the platform scale, weighing after compressing.

Warehousemen should consider the following factors before installing the improved method of weighing:

1. How many bales does the warehouseman expect to weigh before shipping each season, and is the volume large enough to justify the installation?

2. Is the warehouse construction suitable for use of the required equipment? It is recommended that the warehouse floor construction be checked for use of the various pieces of equipment and the impact load of bales being lowered onto the conveyor chain of the automatic dinky press feeder.

3. Is the location of the dinky press suitable for installation of an automatic dinky press feeder, and is there sufficient operating space for a clamp truck to set bales on the platform? For safety, the weigher's desk and working area should be away from clamp-truck traffic and press operations.

The pressing block.--The bales making up each shipping order should be placed in rows at right angles to the main aisle that leads directly to the platform of the dinky press feeder. The width of the rows should be the same as that of the unit loads carried by the clamp truck used to transport bales to the platform of the dinky press feeder. Flat bales that are carried in 3-bale unit loads, for example, should be stored in rows 3 bales wide; standard density bales may be stored in rows 3 or 4 bales wide, depending on the capacity and size of the clamp truck used.

A 2-foot-wide aisle between each group of rows is necessary to keep bales for different shipping orders separated. Standard density bales are stored 1 high on head, and flat bales 2 or 3 high on head. This layout and stacking pattern provide for easy and fast clamp-truck movement, and lessen chances of a mixup in shipping orders.

Modified scissors hooks.--Scissors-type hooks are used by many warehousemen to lift bales. A modified version of the scissors hooks used for lifting bales from the compress door or stacking and breaking out bales from cordwood stacks is recommended for use with the electronic scale (fig. 4). The modified hooks grip the bale firmly; they should be inserted, as shown in the figure, under the first band of the bale. The extended handle on the bale hooks helps the hoist operator to topple bales over onto the dinky press conveyor.

SCISSORS-TYPE HOOK

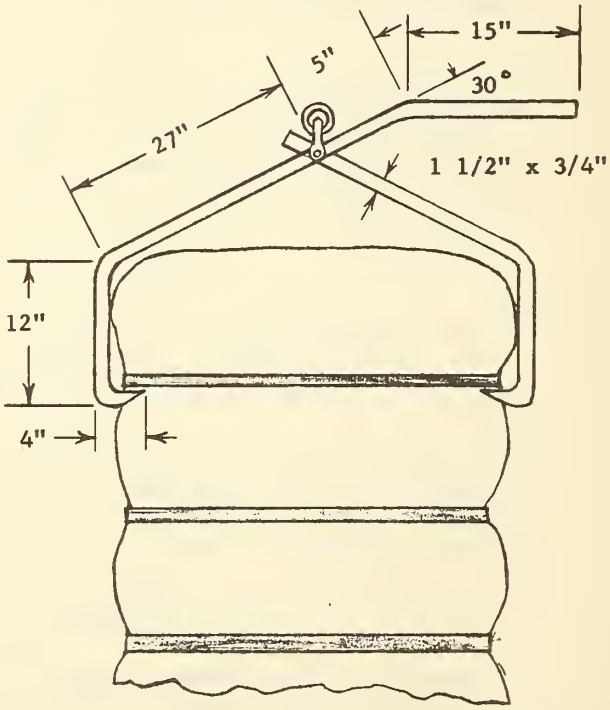


Figure 4

# APPENDIX

## Labor Requirements

The crew sizes for each method of performing the weighing operation, as described in this report, are based on the number of workers required to keep up with a minimum compressing rate of 90 bales per hour and a maximum of about 185 bales per hour. The average production rate of compresses is 100 to 125 high density bales per hour and 120 to 145 standard density bales per hour.

The labor and time required to perform the various elements of weighing were determined by time studies. Labor requirements include productive and unproductive time. Productive time consists of the base time necessary to perform an operation, plus fatigue and personal allowances; unproductive time occurs when one crew member must wait for another to complete a portion of the operation. Such unproductive or wait-time is inherent in the method.

Tables 2 to 4 show the labor requirements and elapsed time, per 100 bales, for weighing with the electronic scale, and with platform scales, before and after compressing. Tables 5 to 7 show the base time, fatigue and personal allowance, and productive time for each element of the operation for all three methods.

## Costs

The cost computations in this report include only the direct labor and equipment costs for performing the weighing operation. Management, warehouse maintenance, overhead, and facility costs are not included, and the cost data therefore do not reflect total costs to the warehousemen. Warehouse managers and supervisors should not use these costs as representing a particular cotton warehouse.

Labor costs are based on the productive time required to perform the operation, plus the wait-time inherent in the method. In arriving at the assumed wage rates, no allowances were made for such additional but indirect labor costs as pay for vacations and holidays, employers' contributions for old age and unemployment compensation, employees' insurance for life and health, or other fringe benefits.

Equipment costs are computed on the basis of ownership costs, which are considered to be relatively constant from year to year, and operating costs, which are variable, as they directly reflect the hours of use of the equipment. Hours of use vary a great deal among individual warehouses, but it is assumed, for the purpose of this report, that the equipment is used for 1,000 hours annually.

Ownership costs consist of depreciation, interest, taxes, and insurance. Operating costs include fuel, oil, electricity, servicing, repairs, maintenance, overhauling, and inspection.

Table 2.--Electronic scale and automatic dinky press feeder: Labor required for a 4-man crew to weigh 100 flat bales of cotton at the compress and transport the bales from the compress to a loading out area

/Elapsed time is 0.59 hour. Clamp trucks carry 3-bale unit loads/

| Time item | Labor required |
|---|---|
| | Man-hours |
| Productive labor: | |
| Clamp-truck operator picks up flat bales at pressing block; transports bales 100 feet to platform of dinky press feeder (and returns to pressing block); and sets bales down on platform | 0.43 |
| Hoist operator lifts bales (1 at a time) for weighing, moves bales and places them on conveyor chain | .30 |
| Weigher collects coupons from bale tags, operates scales, and records data | .31 |
| Clamp-truck operator picks up compressed bales from horizontal position at compress, transports bales 100 feet to loading out area (and returns to compress); and sets bales down in loading area | .59 |
| Total productive labor | 1.63 |
| Unproductive labor | .73 |
| Total labor | 2.36 |

Table 3.--Platform scale, weighing before compressing: Labor required for a 10-man crew to weigh 100 flat bales of cotton at the compress and transport the bales from the compress to a loading out area

/Elapsed time is 0.59 hour. Clamp trucks carry 3-bale unit loads/

| Time item | Elapsed time | Crew size | Labor required |
|---|---|---|---|
| | Hours | Number | Man-hours |
| Productive labor: | | | |
| Clamp-truck operator picks up flat bales at pressing block; moves bales 100 feet to temporary block at scale (and returns to pressing block); and sets bales down in block | 0.43 | 1 | 0.43 |
| Pull-down man assists hand-truck operators in loading bales on hand truck | .29 | 1 | .29 |
| Hand-truck operators load bales on hand truck; move bales 20 feet from temporary block to scale (1 at a time); move bales 20 feet to dinky press; place bales in dinky press; and move hand trucks 20 feet to temporary block for next bale | .26 | 5 | 1.30 |
| Weigher and tag-checker weigh bales, record data, check bale-tag numbers, and collect tag coupons | .46 | 2 | .92 |
| Clamp-truck operator picks up compressed bales from horizontal position at compress; moves bales 100 feet to loading out area (and returns to compress); and sets bales down in loading area | .59 | 1 | .59 |
| Total productive labor | | | 3.53 |
| Unproductive labor | | | 2.37 |
| Total labor | | | 5.90 |

Table 4.--Platform scale, weighing after compressing: Labor required for an 11-man crew to move 100 flat bales to the dinky press and to weigh the bales after they are compressed and transport them to a loading out area

/Elapsed time is 0.46 hour. Clamp trucks carry 3-bale unit loads/

| Time item | Elapsed time | Crew size | Labor required |
|---|---|---|---|
| | Hours | Number | Man-hours |
| Productive labor: | | | |
| Clamp-truck operator picks up flat bales at pressing block; moves bales 100 feet to platform of dinky press feeder (and returns to pressing block); and sets bale down on platform | 0.43 | 1 | 0.43 |
| Hoist operator lifts and moves bales and places them on a chain conveyor (1 at a time) | .30 | 1 | .30 |
| Jib-crane operator lifts and moves 1 compressed bale and loads on hand truck | .31 | 1 | .31 |
| Hand-truck operators pick up loaded hand truck; move bales 20 feet to scale (1 at a time); move bales 20 feet from scale to buck bar; set bales down at buck bar; and return 20 feet to jib crane for next bale | .33 | 4 | 1.32 |
| Set-down man assists hand-truck operators to set down bales at the buck bar | .29 | 1 | .29 |
| Weigher and tag-checker weigh and record data, check tag numbers and collect bale-tag coupons | .46 | 2 | .92 |
| Clamp-truck operator picks up compressed bales at buck bar; moves bales 100 feet to loading out area (and returns to buck bar); and sets bales down in loading area | .46 | 1 | .46 |
| Total productive labor | | | 4.04 |
| Unproductive labor | | | 1.02 |
| Total labor | | | 5.06 |

Table 5.--Productive time required, per 100 bales of cotton, for various handling operations

| Operation and element description | Base time | Fatigue & personal allowance | Productive time | Crew size | Total productive time |
|---|---|---|---|---|---|
| | Hours | Hours | Hours | Number | Man-hours |
| Picking up and setting down bales with a: | | | | | |
| 3-bale clamp truck: | | | | | |
| Flat bales (on head): | | | | | |
| Pick up 3 bales | 0.06 | 0.0060 | 0.07 | 1 | 0.07 |
| Set down 3 bales | .06 | .0040 | .05 | 1 | .05 |
| Compressed bales: | | | | | |
| Pick up 3 bales from on-head position | .08 | .0080 | .09 | 1 | .09 |
| Pick up 3 bales from horizontal position | .20 | .0200 | .22 | 1 | .22 |
| Set bales down in on-head position | .05 | .0050 | .06 | 1 | .06 |
| Hand truck: | | | | | |
| Flat bales: | | | | | |
| Pick up 1 bale on ball side with help of pull-down man | .29 | .0290 | .32 | 2 | .64 |
| Set bale down in dinky press | .20 | .0300 | .23 | 1 | .23 |
| Compressed bales: | | | | | |
| Pick up bale from on-head position with help of pull-down man | .27 | .0270 | .30 | 2 | .60 |
| Set bale down in on-head position at buck bar, with help of set-down man | .26 | .0260 | .29 | 2 | .58 |
| Weighing flat or compressed bales: | | | | | |
| Portable platform dial-type scale, 2-man crew: | | | | | |
| 1 man weighs and records weights and other information; 1 man checks and calls out bale-tag numbers | .42 | .0420 | .46 | 2 | .92 |
| Electronic scale, 1-man crew: | | | | | |
| Weighs bales, checks bale-tag numbers, removes coupon from bale tag, and records weights | .28 | .0280 | .31 | 1 | .31 |
| Hoist operations: | | | | | |
| Electric hoist: | | | | | |
| Attach bale hooks to 1 bale, lift bale, steady it for weighing, move and topple it onto conveyor chain | .27 | .0300 | .30 | 1 | .30 |
| Jib-crane hoist: | | | | | |
| Attach bale hooks to 1 bale, lift bale, move to hand truck, load bale on hand truck, release hook | .28 | .0280 | .31 | 1 | .31 |

Table 6.--Productive time required to transport 100 bales of cotton in open areas with a hand truck (round trip)

| Distance | Productive time | |
|---|---|---|
| Feet | Man-minutes | Man-hours |
| 10 | 22.00 | 0.367 |
| 20 | 30.00 | .500 |
| 30 | 34.00 | .567 |
| 40 | 38.00 | .633 |
| 50 | 43.00 | .717 |
| 60 | 48.40 | .807 |
| 70 | 54.20 | .903 |
| 80 | 60.40 | 1.007 |

Table 7.--Productive time required to transport 100 bales of cotton in open areas with a 3-bale clamp truck (round trip)

| Distance | Productive time | |
|---|---|---|
| Feet | Man-minutes | Man-hours |
| 60 | 15.00 | 0.250 |
| 70 | 16.17 | .269 |
| 80 | 17.00 | .283 |
| 90 | 17.83 | .297 |
| 100 | 18.67 | .311 |
| 120 | 20.33 | .339 |
| 140 | 22.00 | .367 |
| 160 | 23.67 | .394 |
| 180 | 25.33 | .422 |
| 200 | 27.00 | .450 |

Table 8 shows the estimated ownership and operating costs of the equipment used in the methods of weighing described in this report. In warehouses where a specified type of equipment is actually used more than the annual hours of use assumed here, average hourly costs are probably lower. Conversely, average hourly costs are probably higher in warehouses in which the actual hours of use are less.

Table 8.--Estimated costs of ownership and operation of specified types of equipment in cotton compresses, based on 1,000 hours annual use

| Type of equipment | Initial cost 1/ | Period of depreciation | Cost of ownership 2/ | | Cost of operation 3/ per hour | Total cost per hour |
|---|---|---|---|---|---|---|
| | | | per year | per hour | | |
| | Dollars | Years | Dollars | Dollars | Dollars | Dollars |
| 2-wheel hand truck..... | 60 | 20 | 5.70 | 0.006 | 0.007 | 0.01 |
| 3,000-pound-capacity industrial lift truck equipped with a 3-bale clamp... | 6,500 | 8 | 1,105.00 | 1.11 | .67 | 1.78 |
| Electronic scale..... | 2,700 | 20 | 256.00 | .26 | .02 | .28 |
| Portable platform dial-type scale... | 2,600 | 20 | 247.00 | .25 | .21 | .46 |
| Automatic dinky press feeder..... | 3,500 | 10 | 507.50 | .51 | .28 | .79 |
| Electric hoist..... | 300 | 10 | 43.50 | .04 | .01 | .05 |
| Jib-crane steam hoist.. | 300 | 20 | 28.50 | .03 | .01 | .04 |

1/ Equipment cost does not include freight or tax charges.
2/ Allowance for insurance and taxes, 2 percent; allowance on investment, 5 percent.
3/ Average costs: gasoline, 25 cents per gallon; oil, 25 cents per quart; maintenance and parts cost obtained from data accumulated from various-sized warehouses and compresses.

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